

**IN THE CLAIMS:**

- 1 1. (Original) A fuel cartridge for use with a direct oxidation fuel cell, comprising;
  - 2 (A) an exterior housing containing a fuel solution, said housing having an exit
  - 3 port through which fuel is transported out of the cartridge; and
  - 4 (B) a fuel delivery component, comprised substantially of a material, which
  - 5 fuel delivery component, is substantially saturated with fuel for delivery to said
  - 6 fuel cell as fuel is consumed by said fuel cell, said fuel delivery component hav-
  - 7 ing a contact point extending through said exit port in said housing.
- 1 2. (Original) The fuel cartridge as defined in claim 1 wherein said fuel delivery
- 2 component is substantially comprised of a foam-based material.
- 1 3. (Original) The fuel cartridge as defined in claim 1 wherein said fuel delivery
- 2 component is substantially comprised of an expanded polymer.
- 1 4. (Original) The fuel cartridge as defined in claim 1 wherein said fuel delivery
- 2 component is substantially comprised of a felted metal material.
- 1 5. (Original) The fuel cartridge as defined in claim 1 further comprising a second
- 2 port through which said cartridge may be refilled.
- 1 6. (Original) The fuel cartridge as defined in claim 1 including means for interrupt-
- 2 ing the flow of fuel from said fuel delivery component.
- 3
- 4 7. (Currently Amended) The fuel cartridge as defined in [[claim 4]] claim 6
- 5 wherein said means for interrupting the flow of fuel is comprised substantially of [[Kap-

6 ton]] tape substantially covering said contact point [[on said]], and wherein said fuel de-  
7 livery component is comprised substantially of a hydrophilic foam component.

1 8. (Currently Amended) A direct oxidation fuel cell having an associated fuel  
2 source containing a fuel solution, comprising:

3 (A) an outer container;

4 (B) a membrane electrode assembly disposed within said outer container,  
5 including:

6 (i) a protonically conductive, electronically non-conductive mem-  
7 brane electrolyte, having an anode face and an opposing cathode face, an  
8 anode chamber being defined between said anode face and an interior wall  
9 of said container and a cathode chamber being defined between said cath-  
10 ode face and an interior wall of said container; and

11 (ii) a catalyst coating disposed on at least one of said anode face and  
12 said cathode face, whereby electricity-generating reactions occur upon in-  
13 troduction of fuel solution from the associated fuel source, including an-  
14 odic dissociation of said fuel solution into carbon dioxide, protons and  
15 electrons, and cathodic combination of protons, electrons and oxygen from  
16 an associated source of oxygen, producing water;

17 (C) an anodic fuel receptor material disposed in said anode chamber in inti-  
18 mate contact with [[said]] an anodic diffusion layer, said anodic fuel receptor ma-  
19 terial allowing fuel solution to be drawn from said associated fuel source in such a  
20 manner that said fuel solution is drawn into said anode chamber as fuel is con-  
21 sumed at said anode; and

22 (D) means for collecting electric current provided in said electricity-generating  
23 reactions to provide said electric current to an external load.

1 9. (Currently Amended) The direct oxidation fuel cell as defined in claim 8  
2 wherein said anodic fuel receptor material is comprised substantially of a conductive ma-

3      terial to which a process or second material has been applied to create an electronically  
4      conductive, porous, high capillarity material.

1      10.     (Currently Amended) The direct oxidation fuel cell as defined in claim 8  
2      wherein said anodic fuel receptor material is comprised substantially of foam materials.

1      11.     (Currently Amended) The direct oxidation fuel cell as defined in claim 8  
2      wherein said anodic fuel receptor material is comprised substantially of a felted metal  
3      material.

1      12.     (Cancelled)

1      13.     (Currently Amended) The direct oxidation fuel cell as defined in [[claim 12]]  
2      claim 8 further comprising a wire mesh disposed between said anodic diffusion layer and  
3      said anodic fuel receptor material to facilitate conducting electrons produced in said an-  
4      odic reaction to the external load.

1      14.     (Original) The direct oxidation fuel cell as defined in claim 8 further comprising  
2      a cathodic foam component comprised substantially of a hydrophilic material which  
3      draws water away from said cathode face of said membrane.

1      15.     (Currently Amended) The direct oxidation fuel cell as defined in [[claim 8]]  
2      claim 14 further comprising a wire mesh disposed between said cathodic diffusion layer  
3      and said cathodic foam component to facilitate conducting electrons.

1      16.     (Original) The direct oxidation fuel cell as defined in claim 8 further comprising  
2      a vent disposed in said anode chamber to allow carbon dioxide to flow out of said anode  
3      chamber.

1 17. (Original) The direct oxidation fuel cell as defined in claim 16 wherein said vent  
2 is comprised substantially of a material that resists oxygen from entering said anode  
3 chamber.

1 18. (Currently Amended) The direct oxidation fuel cell as defined in claim 17  
2 wherein said vent is comprised substantially of [[Teflon AF]] a polytetrafluoroethylene  
3 material.

1 19. (Currently Amended) A direct oxidation fuel cell system comprising:  
2 (A) a direct oxidation fuel cell including:  
3 (i) a membrane electrode assembly, including:  
4 a.) a protonically conductive, electronically non-conductive  
5 membrane electrolyte, having an anode face and an opposing cath-  
6 ode face; and  
7 b.) a catalyst coating disposed on at least one of said anode  
8 face and said cathode face, whereby electricity-generating reac-  
9 tions occur upon introduction of fuel solution from an associated  
10 fuel source, including anodic dissociation of said fuel solution into  
11 carbon dioxide, protons and electrons, and cathodic combination of  
12 protons, electrons and oxygen from an associated source of oxy-  
13 gen, producing water;  
14 (ii) an anodic fuel receptor material disposed in said anode chamber in  
15 intimate contact with [[said]] an anodic diffusion layer, said anodic fuel  
16 receptor material allowing said fuel solution to be drawn from said asso-  
17 ciated fuel source in such a manner that said fuel solution travels through  
18 to said anode face as fuel is consumed at said anode;  
19 (iii) means for collecting electric current provided in said electricity-  
20 generating reactions to provide said electric current to a load; and  
21 [[(B) a fuel source; and]]

22       ~~[(C)](B)       a fuel container and delivery assembly adapted to be coupled to an~~  
23       ~~associated fuel source when said fuel container is to be filled with fuel and said~~  
24       ~~fuel container and delivery assembly adapted to be coupled [[between said fuel~~  
25       ~~source and]] to said direct oxidation fuel cell, when fuel is being delivered to said~~  
26       ~~fuel cell.~~

1       20. (Original) The direct oxidation fuel cell system as defined in claim 19 wherein  
2       said fuel container and delivery assembly comprises;  
3           (A) an exterior housing containing a fuel solution, said housing having an exit  
4       port through which fuel is transported out of the cartridge; and  
5           (B) a fuel delivery component, comprised substantially of a material which is  
6       substantially saturated with fuel for delivery to said fuel cell as fuel is consumed by said  
7       fuel cell, said fuel delivery component having a contact point extending through said exit  
8       port in said housing.

1       21. (Currently Amended) The direct oxidation fuel cell system as defined in claim  
2       20 wherein a contact point is defined at the connection between said fuel delivery com-  
3       ponent and said anodic receptor ~~[[component]]material~~, and flow of fuel from said fuel  
4       delivery component to said anodic receptor ~~[[component]]material~~ is interrupted when  
5       said contact point is broken.

1       22. (Original) The direct oxidation fuel cell system as defined in claim 21 further  
2       comprising means for interrupting flow of fuel across said contact point.

1       23. (Currently Amended) The direct oxidation fuel cell system as defined in claim  
2       22 wherein said means for interrupting the flow of fuel across said contact point is a pair  
3       of ~~[[SMA]] shape memory alloy~~ strips placed adjacent said contact point, which have a  
4       first shape that allows the contact to be made between the fuel delivery component and  
5       the anodic receptor ~~[[component]]material~~ to allow the flow of fuel therebetween, and a

6 second shape that interrupts said contact between said fuel delivery component and the  
7 anodic receptor [[component]]material.

1 24. (Currently Amended) The direct oxidation fuel cell system as defined in claim  
2 23 wherein said [[SMA]]shape memory alloy strips are comprised substantially of nitinol.

1 25. (Currently Amended) The direct oxidation fuel cell system as defined in claim  
2 23 further comprising a means for providing an electric current across said [[SMA]]  
3 shape memory alloy strips to cause each of said [[SMA]] shape memory alloy strips to  
4 take [[it]] a second shape, thus interrupting the flow of fuel in said system.

1 26. (Original) The direct oxidation fuel cell system as defined in claim 19 further  
2 comprising said fuel delivery cartridge including a mechanism at said exit port whereby  
3 flow of fuel out of said fuel cartridge is halted when said mechanism is in a closed posi-  
4 tion, and said mechanism automatically changes to said closed position when said fuel  
5 delivery cartridge is disconnected from said fuel cell.

1 27. (Original) The direct oxidation fuel cell system as defined in claim 26 wherein  
2 said mechanism is a duckbill valve that moved to an open position when said anode  
3 chamber of said fuel cell is connected to said fuel delivery cartridge.

1 28. (Original) The direct oxidation fuel cell system as defined in claim 19 further  
2 comprising a fuel cell assembly including a fuel cell stack, and at least one of said fuel  
3 cells in said stack including a wicking arm that draws fuel into that cell either from a fuel  
4 source, or from a cell which is contiguous to it in said stack.

1 29. (Original) The direct oxidation fuel cell system as defined in claim 28 further  
2 comprising each cell in said fuel cell stack including a wicking arm that communicates  
3 with the anode face of each cell in the stack.

1 30. (Original) The direct oxidation fuel cell system as defined in claim 19 further  
2 comprising refilling said fuel delivery cartridge using a methanol cartridge to substan-  
3 tially saturate said fuel delivery component with fuel solution.

1 31. (Original) The direct oxidation fuel cell system as defined in claim 19 further  
2 comprising an interface disposed between said fuel delivery cartridge and said fuel cell to  
3 provide a seal against at least one of evaporative losses and leakage losses.

1 32. (Currently Amended) A refillable direct oxidation fuel cell system, comprising:  
2 (A) an exterior casing having an opening therein [[thought]] through which  
3 fuel solution may be introduced;  
4 (B) a direct oxidation fuel cell including:  
5 (i) a membrane electrode assembly, including:  
6 a.) a protonically conductive, electronically non-conductive  
7 membrane electrolyte, having an anode face and an opposing cath-  
8 ode face; and  
9 b.) a catalyst coating disposed on at least one of said anode  
10 face and said cathode face, whereby electricity-generating reac-  
11 tions occur upon introduction of fuel solution from an associated  
12 fuel source, including anodic dissociation of said fuel solution into  
13 carbon dioxide, protons and electrons, and cathodic combination of  
14 protons, electrons and oxygen from an associated source of oxy-  
15 gen, producing water;  
16 (ii) an anodic fuel receptor material disposed in said anode chamber in  
17 intimate contact with [[said]] an anodic diffusion layer, said anodic fuel receptor  
18 material allowing said fuel solution to be transported from said associated fuel  
19 source in such a manner that said fuel solution travels through to said anode face  
20 as fuel is consumed at said anode;

21 (iii) means for collecting electric current provided in said electricity-  
22 generating reactions to provide said electric current to a load; and

23

24 (C) a fuel container and delivery assembly coupled to said direct oxidation  
25 fuel cell, said fuel container and delivery assembly including a fuel delivery component  
26 that allows fuel to be transported to said anode fuel receptor, and said fuel container and  
27 delivery assembly including a re-fueling port that communicates with said opening said  
28 casing, for refilling the fuel in said fuel container and delivery assembly.